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**The Geography of New Firm Formation: Evidence from  
Independent Start-ups and New Subsidiaries in the Netherlands**

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# **The Geography of New Firm Formation: Evidence from Independent Start-ups and New Subsidiaries in the Netherlands**

## **ABSTRACT**

This paper investigates to what extent determinants of the rate of independent start-ups and the rate of new subsidiaries are different. Using a regional data base for the Netherlands over the period 1988-2002, we investigate the impact of two types of agglomeration effects, localisation and urbanisation, while controlling for a range of economic variables. We find urbanisation economies to be particularly important for the creation of new subsidiaries while localisation economies are more important for the creation of independent new ventures. Finally, the effect of agglomeration variables is found to be stronger for manufacturing industries compared to services industries.

**JEL CODES:** J23, M13, R12

**KEYWORDS:** agglomeration economies, subsidiaries, independent start-ups, regions, the Netherlands

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## **1. Introduction**

Regional governments have been competing for employment, entrepreneurship and productivity for centuries. So when Michael Porter narrowed his “Competitive Advantages of Nations” to the regional level, in a period in which data collection was thriving, this certainly boosted the creation of new regional indices (Porter, 1990; Porter, 2000; Kitson, Martin & Tyler 2004). However, the relevance of the regional (sub-national) scale was certainly not new. As regards entrepreneurship, this was already confirmed by the high degree of variance in firm entry rates across regions, as found in the first waves of consistent regional data collection on firm formation (see e.g. Reynolds, Storey & Westhead, 1994). Furthermore, globalization and openness of markets, especially in the European Union, fed the notion that regions were gaining importance over nations. The research question “what determines the rate of firm entry” was initially primarily analysed at the industry level (Mansfield, 1962; Orr, 1974) although Hoover & Vernon (1962) already pointed out differences in spatial scales. By now it is generally acknowledged that the regional dimension must be included (Fritsch & Schmude, 2006). The question has become even more relevant because some recent empirical studies find a significant effect of different aspects of business dynamics on regional economic growth (e.g. van Stel & Suddle, 2005; Audretsch & Keilbach, 2004; Van Stel & Storey, 2004)<sup>i</sup>.

The effect of regional economic conditions on new firm formation has already been documented extensively since the early 1990s using firm formation data at the regional level that became available since the early 1980s (see e.g. Audretsch & Fritsch 1994a; Keeble & Walker 1994; Reynolds 1994). Determinants of entry were primarily derived from the type of models explaining annual entry rates across sectors

from an industrial organization perspective (see e.g. Siegfried & Evans 1994, Carree & Thurik 1996). A new set of studies added spatial economics to this type of research (Fotopoulos & Spence 1999, Armington & Acs 2002, Nyström 2005, Van Oort & Stam, 2005). These studies demonstrated the importance of localization and urbanization economies for firm formation rates in a region.

Data in the current paper show that, in the past decade, the Netherlands has witnessed an increase in the number of new subsidiaries, relative to the total number of entries from 32% in 1988 to 39% in 2002. The regional average in this period ranges from 16% to 46%. In this paper we argue that the incentives for establishing a firm in one particular region are essentially different for independent start-ups as compared to new subsidiaries. In general, the independent firm founder will base his or her choice whether or not to start a firm on the expected rewards of this new firm, relative to an alternative option such as becoming or remaining an employee with more certainty on monthly earnings, see e.g. Kihlstrom & Laffont (1979, 1983), Parker (2004). This choice may be contingent on location factors but the decision is very much an intrinsic one. Research has shown that practically all firm founders start their venture in their own region (Figueiredo, Guimaraes & Woodward, 2002; Stam 2007). This suggests that the number of independent firm founders who choose the location of their firm primarily on the basis of regional characteristics is very limited. For example, only 25% of firm founders in the Netherlands even considered an alternative location before they started their firm (EIM, 2002). As regards the formation of new subsidiaries, location matters can be expected to receive much more attention. Because the founders of the subsidiary company often do not have to work in the subsidiary company themselves, they may choose the best location without having to

consider the consequences for their personal life of moving to another region. In other words, the choice of location can be made purely on profit maximizing grounds. These aspects will vary among different regional production milieus, i.e. infrastructure, costs structure, local demand etc. Therefore we expect that specific locational characteristics captured by measures of localization economies and urbanization economies may be particularly important determinants of the number of new subsidiaries.

Although there is an extensive literature on the determinants of regional new firm formation, to our knowledge there are no studies investigating the determinants of the number of independent start-ups and the number of new subsidiaries separately. As regards the Netherlands the study by Wever (1984) only *described* the differences between independent start-ups and branch plants in the Netherlands. The data base employed in the present paper enables us to distinguish between these two modes of entry. Using a data base at the Dutch regional and sectoral level for the period 1988-2002, we investigate to what extent the determinants of independent start-ups and new subsidiaries are different. We include determinants on the demand side and supply side of entrepreneurship (see Verheul, Wennekers, Audretsch & Thurik, 2002, for a conceptual framework). In this we highlight the effects of localization economies and urbanization economies from the economic geography literature, as well as policy environment variables. As argued we expect that particularly localization economies and urbanization economies may have a strong impact on the number of new subsidiaries as compared to the number of independent start-ups.

The setup of this paper is as follows. We start with a review of the literature, followed by descriptions of our database, our research model and our methodology. The final sections are used for the description and interpretation of our estimation results.

## **2. Review of the Empirical Literature**

From the early 1990s several empirical studies have shown that a high proportion of regional variation in firm births in several European countries can be explained by appreciating the specific characteristics of different regions within countries (a.o. Audretsch & Fritsch, 1994a; Keeble & Walker, 1994; Reynolds et al., 1994, Armington & Acs, 2002). These relevant factors can be grouped under the following broad headings: (i) demand and supply factors for entrepreneurship, (ii) agglomeration effects and (iii) cultural or policy environment determinants. Below we assess these groups of determinants from the empirical literature that predominantly takes independent start-ups as a point of departure. At the end of this section we briefly discuss the expected differences between determinants of independent entry and determinants of new subsidiaries by relating this to the empirical literature of location determinants of multinational enterprises.

### **Demand and Supply for Entrepreneurship**

Since new businesses tend to serve local markets, spatial variations in local consumer demand conditions are likely to be important in the demand for entrepreneurship. Among others, Keeble & Walker (1994), Armington & Acs (2002) and Reynolds Miller & Maki (1995) find that population growth has a significant positive effect on entry rates. Income is another factor that influences demand in a specific region, as increased levels of incomes increase demand. However income growth also implies



greater access to capital for a potential entrant (e.g. Reynolds, 1994) and can as such be seen as a supply factor. For one particular form of income, viz. wages, there may also be negative effects involved as increased wage rates increase the opportunity costs of self-employment, and also the cost of hiring workers (Ashcroft, Love & Malloy, 1991). Hence the overall effect of wages may be positive or negative. Expected profitability can also explain entry, although data are not easily available (e.g. Siegfried & Evans, 1994). Next, economic output is a driver of the dynamics of entry, as this may indicate favourable economic conditions for running a firm (Audretsch & Keilbach, 2004). The spatial variation in industry mix may also be important, as a high degree of services in a certain area may provide more opportunities for new firm formation because of lower average start-up costs (e.g. Fritsch, 1997). Likewise, a smaller degree of manufacturing has a positive effect on the start-up ratio (Evans & Leighton, 1989; Reynolds et al., 1995). A final demand factor is the size structure of local industry. The idea is that greater competition in a region contributes to new firm formation. Areas with a relatively greater amount of small scale activity therefore tend to have higher birth rates *ceteris paribus* (cf. Ashcroft et al., 1991; Fotopoulos & Spence, 1999; Armington & Acs, 2002; Gabe, 2003).

Unemployment may be important in the supply side context of new firm formation, as the unavailability of paid employment opportunities may increase the self-employment rate and thus entry (Storey, 1991; Evans & Leighton, 1990; Johnson & Parker, 1996). However, the role of unemployment in influencing spatial variations in new firm formation rates is neither simple nor consistent (Audretsch & Fritsch, 1994b; Stam, 2008), as some studies show that a high unemployment ratio reflects a

weak regional economic situation and thus hampers new firm formation (Reynolds et al., 1994; Carree, 2002; Sutaria & Hicks, 2002). Several studies have investigated the effect of the composition of population and labour force on firm entry. The proportion of highly skilled labour (cf. Audretsch & Fritsch, 1994a; Fotopoulos & Spence, 1999) and the proportion of college graduates (cf. Armington & Acs, 2002) have a positive effect on new firm formation. Also, demographic characteristics may be relevant determinants on the supply side. Age, gender and ethnic origin are particularly relevant (resp. Evans & Leighton, 1989; Verheul, 2005; Clark & Drinkwater, 1998)<sup>ii</sup>. The availability of financing is a further supply side factor found to be important in explaining regional variation in firm birth rates (Reynolds et al., 1994). Finally, personal wealth may be important in the context of new firm formation. It can be measured by household income, the presence of owner-occupied housing, housing prices and land prices. Reynolds et al. (1995) find a weak positive effect for the US, but Ashcroft et al. (1991) find a significant positive effect of owner-occupied housing on new firm formation in the British counties.

### Agglomeration Effects

Whereas the above general demand and supply factors are relevant for analysis on individual, sub-national and national level, agglomeration effects particularly relate to the sub-national scale. Agglomeration effects contribute to new firm formation via increased local market opportunities in terms of customers and required inputs (Reynolds et al., 1994; Fritsch, Brixey & Falck, 2006). Also a higher diversity of the population in dense areas leads to a higher variety in demand for products and services, which, in turn, stimulates the emergence of niche markets. Positive agglomeration effects also include access to a broader labour market, the sharing of

research organizations and the easier diffusion of (tacit) knowledge (Werker & Athreye, 2004, p. 508). Hence, heavily populated areas are attractive locations to start new firms. Several studies show that agglomeration, controlled for other determinants, indeed has a positive impact on the rate of new firm formation (Audretsch & Fritsch, 1994a; Keeble & Walker, 1994; Reynolds et al., 1994; Armington & Acs, 2002).

Proxies of agglomeration effects are the degree of localisation and the degree of urbanisation. Localisation economies differ from urbanisation economies in that localisation economies are associated with benefits for firms that arise when locating near to other firms in the same industry, while urbanisation economies are associated with benefits for firms that arise when locating near to firms irrespective of their activity (Frenken, Van Oort, Verburg & Boschma, 2005). Benefits emerging from localisation economies include transmission of (tacit) knowledge between firms locating close to each other (knowledge spillovers). Nyström (2005) argues that within-industry agglomeration may increase the creation of strong knowledge-intensive regional clusters for innovative entrepreneurship. Benefits emerging from urbanisation economies are broader than knowledge spillovers and also include more general agglomeration benefits such as closeness of a large and diversified customer base, closeness of suppliers, access to a highly qualified labor pool, etc.

Negative agglomeration effects exist as well. For instance, if too many firms locate close to each other, it might cause increasing wages and increased input prices (including land use and housing) when they compete for the same resources, possibly deterring entry (Nyström, 2005; Arauzo-Carod & Teruel-Carrizosa, 2005). Negative

effects of agglomeration also include congestion. However, as noted above, most studies report positive effects of agglomeration on new firm formation, suggesting that the positive agglomeration effects outweigh the negative effects.

### Policy Environment and Culture

Governments may attempt to influence the demand for entrepreneurship and its supply directly or indirectly (Verheul et al. 2002). Indirect policy measures aim to stimulate demand and supply factors described above. In this section we focus on the effects of direct policy measures. Johnson & Parker (1996) argue that there may be spatial variations in the supportiveness of local authorities in relation to small business activity. Sutaria & Hicks (2002) use the local government spending, proxied by the local government's per capita expenditure on service delivery. Also, taxation and interest rates can be relevant, but it is likely that the regional influence within countries is small. Cultural differences are at play to a very limited extent within national borders (Davidsson & Wiklund, 1997, Wennekers, 2006). A pervasive problem with investigating the effects of local policy in empirical analyses is the limited availability and quality of the data.

### Determinants of Regional Variation in the Number of New Subsidiaries

What can we expect regarding differences in determinants between independent entry and new subsidiaries? Since there is practically no existent empirical research into the determinants of regional variation in new subsidiaries we adopt the findings in the literature on location decisions of multinational enterprises (MNE's). In this, we assume that for new subsidiaries similar processes are underlying the location decisions as those for multinational enterprises. The empirical literature points at the

importance of most of the determinants discussed above, but the balance may be different. Coughlin & Segev (2000), for instance, find significant impacts of economic size, educational attainment, localization economies and urbanization economies on firm formation for MNE's in US manufacturing. In addition, they found the region's transportation infrastructure (measured by the existence of an interstate highway), as well as state and local taxes (negative) to play a key role. The latter finding is confirmed in Holl (2004) for (primarily) independent entry in manufacturing and services in Portugal. It must be noted however, that it is difficult to disentangle the effects of infrastructure from the effects of urbanisation economies and economic size. From a conceptual point of view and considering the findings in the empirical MNE literature we expect that localisation and urbanisation advantages especially relate to the creation of new subsidiaries. As regards policy environment, it depends on the kind of policy measures considered. For example, regional differences in taxes might, conform the findings by Coughlin & Segev (2000) for MNE's, especially affect new subsidiaries. Other measures that aim at reducing barriers to start especially from the individual's point of view would be particularly beneficial for increasing the number of independent start-ups.

### **3. Data and Methodology**

We use a regional panel dataset on annual numbers of independent start-ups and new subsidiaries for the Netherlands, identifying 40 regions at the NUTS 3 level in a 14 year period (1988-2002). The NUTS 3 level is the most suitable level of territorial aggregation for the Netherlands (cf. van Stel & Nieuwenhuijsen 2004, Kleinknecht & Poot, 1992). It consists of functional regions that indicate a regional labour market. The data are provided by the Dutch Chamber of Commerce and based on new

registrations.<sup>iii</sup> The definition of new subsidiaries excludes spin-outs; a condition is that an existing firm is accountable of initiating the new firm.

#### Entry Rates in 40 Regions in the Netherlands

Audretsch & Fritsch (1994b) set out two approaches in measuring entry. The first measure applies the so-called ‘labour market approach’, in which annual firm formation is related to the number of employees (in the same region, sector and year). This reflects the assumption that new entrepreneurs originate from the existing pool of labour. The second measure, known as the ‘ecological approach’, calculates entry rates based on the stock of existing firms. Audretsch & Fritsch show that the two measures demonstrate very different patterns for Germany. In most empirical studies investigating determinants or economic consequences of regional entry rates, the labour market approach is applied (see e.g. van Stel & Storey, 2004). The difference in the two approaches mirrors our conceptual argumentation to separate independent start-ups from start-ups originating from incumbent firms. Thus, we relate independent entry to the workforce in the same region, while the number of new subsidiaries is related to the number of existing firms. In other words we assume that independent entry stems from the existing pool of labour while new subsidiaries stem from the stock of existing firms.

Regarding the time dimension, Fritsch & Mueller (2006) report that the level of regional new firm formation activity shows a pronounced path dependency and persistence over time. Regions with relatively high rates of new firm formation in the past are likely to experience a corresponding high level of start-ups in the near future. This pattern is found for the Netherlands as well. Figure 1 sets out the regional

patterns for independent start-up rates (left hand side) and new subsidiaries (right hand side). The upper graphs A1 and B1 are averages for 1988-1992; the lower graphs A2 and B2 refer to the same measures one decade later. We see for both time spans that independent entry is concentrated within the central area known as the Randstad. However the Netherlands' two largest cities (and mainports) Amsterdam and Rotterdam, although part of the Randstad, are not in the highest level category. Focusing on the right hand side in figure 1, the Amsterdam and Rotterdam regions exhibit consistently high rates of new subsidiaries. Here we also see more changes between the two time frames; especially the southern area near Eindhoven has gained more new subsidiaries. In general there seems to be an optical negative correlation between regional rates of independent entry and new subsidiaries: regions in the highest category of independent entry rates are not in the top category of rates of new subsidiaries and vice versa. However, although the correlations are indeed negative for both periods (-0.21 for 1988-1992 and -0.11 for 1998-2002), they are not statistically significant. Still, since we intend to explain both modes of new firm formation, we have to acknowledge their possible interdependence in our empirical analyses. We will elaborate on this in the next section.

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Insert Figure 1 about here  
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## Methodology

While demonstrating geographical variations in entry rates is a valuable exercise, there is no guarantee that using these rates enlightens our objective to assess the determinants of new firm formation (rather than determinants of new firm formation

*rates*). Instead, we view the size of the workforce and the stock of existing firms as control variables in explaining the number of respectively new independent firms and new subsidiaries. As the propensity to start firms differs across sectors, the coefficients for the scaling variables are expected to differ across sectors of industry.

Accordingly our empirical model can be described by equations 1a and 1b. The dependent variables  $ENTRY^{ind}$  and  $ENTRY^{sub}$  are the annual numbers of independent start-ups and new subsidiaries respectively;  $N_{workf}$  is the size of the workforce (number of employees added with the number of people receiving an unemployment benefit) while  $N_{firm}$  is the number of existing firms. We explicitly allow the coefficient  $\gamma$  to deviate from unity in both equations; regressing entry *rates* would come down to forcing  $\gamma$  to be equal to one. Demand and supply factors related to entrepreneurship are captured in the matrix  $X$ , including the incentives and barriers, agglomeration effects and policy environment discussed in the literature section. Policy environment effects may be present if the qualities of institutions differ across regions and/or institutions may change over time. For the Netherlands we have no evidence of institutional or cultural differences that would affect regional variation in start-up behaviour. We do investigate a possible institutional effect over time by measuring the impact of an important relaxation of the Establishment Act in the Netherlands in 1993 (see e.g. Carree and Nijkamp, 2001).



$$(1a) \quad \ln(ENTRY^{ind}) = \alpha^{ind} + \gamma^{ind} \ln(N_{workf}) + \beta^{ind} X + \varepsilon^{ind}$$

$$(1b) \quad \ln(ENTRY^{sub}) = \alpha^{sub} + \gamma^{sub} \ln(N_{firm}) + \beta^{sub} X + \varepsilon^{sub}$$

We estimate equations (1) by taking logarithms. As mentioned, rather than regressing entry rates directly, we test if  $\gamma$  differs significantly from 1. We estimate three models, an aggregate model and two sector models. The first model is an aggregate model on the regional level (whole regional economy). To investigate sector differences we also estimate the equations separately for manufacturing and services. In our paper the manufacturing sector includes the International Standard Industrial Classification code D, while the services sector includes the ISIC codes J, K, N, O and P. In the aggregate model regional entry is corrected for regional differences in industry structures at the 1-digit level, using employment data. This is necessary as differences in sector structure may cause regional startup rates to be different. Annual firm formation and independent variables are controlled for sector differences by imposing the national sector structure (see Ashcroft et al 1991, van Stel & Storey 2004).

When estimating the model there are a number of methodological issues to be dealt with. *First*, the two dependent variables in our study are mutually correlated and so may the error terms. Although the correlation between independent entry and new subsidiaries is positive (coefficient ranges from 0.59 in 1990 to 0.80 in 2002)<sup>iv</sup>, the correlation between the error terms could be zero or negative. Therefore we use SUR (seemingly unrelated regression) as estimation technique. SUR estimation provides separate sets of coefficients for both equations but acknowledges correlations between the error terms of both equations (Zellner 1962, 1963). *Second*, as we are mainly

interested in the effect of the geography variables which hardly vary over time, fixed effects estimation is not a suitable estimation technique, even though our data base has a panel structure. We will not include regional dummies because it would make us unable to estimate the effect of the geography variables. *Third*, as shown in the data section, start-up rates are heavily correlated over time. The observations for the individual years between 1988 and 2002 are insufficiently independent and hence including all years in the sample may result in an underestimation of the standard errors of the estimated coefficients, yielding artificially high significance levels. To deal with this problem we will use only four years that are equally distanced from each other: 1990, 1994, 1998 and 2002. We argue that the four year distance between these sample years make the time observations sufficiently independent from each other.

#### Independent Variables

We include the following variables as scaling variables in our regression. *Workforce* is measured by the number of employees in each region plus the number of people receiving an unemployment allowance, in logarithm. We expect that this coefficient will be close to one, which would *ceteris paribus* reflect a constant start-up rate with respect to the workforce. For new subsidiaries, we take the log of the number of existing firms (at the beginning of the year) as the scaling variable.

We include three indicators measuring changes in demand and supply factors. *Growth in value added* is expected to have a positive impact on firm formation. *Growth in the average wage rate* measures the development of the opportunity costs of self-employment and a growth in wages would *ceteris paribus* imply a decrease in

independent firm entry – for new subsidiaries this effect is not hypothesized. On the other hand, the effect of wage growth may reflect economic growth (if not sufficiently captured by other determinants) and as such induce new firm formation since the expected rewards of starting a business are higher. *Population growth* reflects increased supply as well as demand for new entrepreneurship; therefore we expect its effect on both measures of new firm formation to be positive. The supply side is also captured by the number of people that newly applied for an *unemployment benefit* in the region, where we expect a positive sign due to the abovementioned ‘unemployment push’ effect. However, as discussed, high unemployment can also be seen as a sign of economic downturn and as such be a demand indicator with an expected negative sign. We also include a dummy variable indicating whether or not there is a university in the region. The hypothesis is that the presence of universities creates more opportunities for knowledge-based entrepreneurship (see e.g. Armington & Acs, 2002).

We include two agglomeration indicators. The first is the number of active firms in the same sector relative to population. It captures the importance of clustering and within-sector knowledge spillovers (*localisation economies*). A disadvantage of our measure is that the sectors may be too broadly-defined to adequately measure localisation economies. In the analysis for the entire regional economies we will interpret this variable merely as a measure of competition. The degree of *urbanization* is measured by the percentage of people living in a highly urbanised or urbanised area<sup>v</sup>. It captures general benefits of locating in dense regions. This measure is time independent and calculated for the year 1996.

Our policy environment variable relates to the significant *relaxation of the Establishment Act* in 1993. A large part of mandatory courses required for the new self-employed were abolished. There have been several studies that confirmed a significant increase of firm entries since that year (e.g. Bosma, de Wit & Carree, 2005, Carree & Nijkamp, 2001). As this policy change was implemented in all Dutch regions in 1993, we capture the policy effect by examining the coefficients for the year dummies. The reference year in the regressions is 1990, therefore we expect a significant impact for 1994 and 1998 and 2002.

The hypothesised effects of our determinants are presented in Table 1, along with findings from other studies and the data sources for the present study. As argued, we expect differences between determinants of independent entry and those of new subsidiaries for urbanization economies and, to lesser extent, for localization economies. Considering the nature of the policy change, which is aimed at reducing barriers to entry for individuals, we expect this variable to primarily influence independent start-ups.

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Insert Table 1 about here  
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#### **4. Results**

The results of the regression for the entire regional economies are presented in table 2. Both scaling variables, the working force for independent entry and the stock of firms for new subsidiaries, appear to be close to unity; the coefficients do not significantly

deviate from 1. Nonetheless, the coefficient for new subsidiaries appears to be higher than the one for independent start-ups in all regressions. This was to be expected considering the increasing share of new subsidiaries in total new firm formation. Growth in value added is positively linked to independent firm formation, while the rate of newly unemployed affects the number of independent start-ups negatively. For both determinants we find no effect on the number of new subsidiaries. This suggests that the business cycle – proxied by growth in value added and entry in unemployment - affects the degree of firm formation through independent firms rather than through new subsidiaries.<sup>vi</sup> Yet the positive coefficient for 1998, a very prosperous year for the Dutch economy, in the final column in table 2 may also be seen as a specific business cycle effect. Population growth is an important determinant for the number of new subsidiaries, reflecting an increase in demand for additional firms. We do not find a significant effect for the presence of a university. As expected and already revealed by Figure 1, a high degree of urbanization involves relatively more new subsidiaries. The effect of the new Establishment Act seems to have had a clear impact on independent entry. All years since 1993, the year in which the Act became effective, have significantly higher number of entries in comparison to 1990, controlled for all other determinants. As hypothesized, the effect of this policy variable is stronger for independent start-ups.

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Insert Table 2 about here  
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For manufacturing (table 3), localization seems to be especially important with independent entry. Clustering of firms seems to be important in manufacturing, facilitating easier diffusion of (tacit) knowledge. However, we should be cautious since we deal with Manufacturing as a 1-digit sector. We do not find a significant effect for new subsidiaries. Perhaps spillovers are relatively less important for new subsidiaries since they may dispose of specific knowledge through the mother company. In other words, they may be less dependent on spillovers to obtain new knowledge compared to independent start-ups. The degree of urbanization impacts both components of new firm formation similarly. New subsidiaries do not seem to be influenced by growth in wage rates and unemployment levels. This is in contrast to independent start-ups where growth in wage rate appears to deter entry, possibly due to the increased attractiveness of employment. The effects associated with the rate of newly unemployed mirrors the results of the entire regional economies.

The results for services sectors are shown in table 4. The estimates of the scaling variable (indicating economic size) are higher than in manufacturing as in Holl (2004), reflecting the need of more spatial proximity in services. The outcomes of the general demand and supply resemble the outcomes in table 2. As regards agglomeration effects, we find a (weakly) positive effect for localization economies only for independent entry. We find a negative effect for urbanization economies in relation to independent entry. A possible explanation is that many new firms in services, although benefiting from spatial proximity, are less dependent on the availability of qualified labour and other urbanisation advantages.<sup>vii</sup> In other words, the incubator function of urbanization associated with the work of Hoover & Vernon (1962) is of less relevance for services. Unfortunately we cannot distinguish between

high-skilled services and low-skilled services. For independent entry in high-skilled services we would have expected a positive effect of urbanization. The estimated impact of urbanization on the number of new subsidiaries is positive weakly significant, suggesting that positive agglomeration effects play a role in the location choice of new subsidiaries. The designed effect of the policy change, captured by the year dummies is not as pronounced as in manufacturing.

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Insert Table 3 about here

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Insert Table 4 about here  
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## **5. Concluding remarks**

New businesses are important for economic development. Therefore there has been a substantial amount of studies explaining regional variations in firm formation. This paper contributes to the existing literature by separating independent start-ups from new subsidiaries. As shown in figure 1, different spatial patterns exist in these two components of total firm formation for the Netherlands, which supports the idea to disentangle determinants of the numbers of new independent firms and those of new subsidiaries.

In particular we are interested whether different types of agglomeration effects, i.e. localisation and urbanisation, impact rates of independent start-ups and rates of new subsidiaries differently. Our empirical exercises revealed three important results. *First*, urbanisation economies have a particularly strong impact on the number of new

subsidiaries, suggesting that general benefits of locating in dense areas are indeed important considerations for entrepreneurs when they choose a location to establish a new subsidiary firm. This effect is weaker for independent entry. *Second*, localisation economies are particularly important for independent start-ups, implying large benefits (in particular knowledge spillovers) of clustering together with firms from the same sector. This effect is weaker for new subsidiaries possibly indicating a smaller dependence on spillovers to obtain new knowledge. *Third*, agglomeration effects are more important in manufacturing industries compared to services industries. This reflects the higher degree of knowledge-intensity in manufacturing firms.

Apart from the effects of urbanisation and localisation, another notable finding of our work is the lack of an effect of the presence of a university in the region. Although we cannot claim to measure transfer of knowledge to new ventures since we cannot separate high-skill firms from low skill-firms, our results are in line with the general notion in the Netherlands that – while the quality of knowledge creation is at least acceptable – the degree of technology/knowledge transfer to (new) firms has been lagging behind so far (see EIM/EZ, 2003). The same measure was found positive and significant for United States regions, for example (see Armington & Acs 2002).

A limitation of our work is the high sectoral aggregation level applied. Future research should use data at lower sectoral levels. However, to our knowledge there are no data sets available where firm demography statistics are simultaneously available at low regional *and* low sectoral levels. This defines an important challenge for statistical bureaux as well.



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TABLE 1  
Determinants of new firm formation included in this study

	Expected signs	Findings in literature	Source
<i>Demand &amp; supply</i>			
Growth in value added - percentage growth between (t-3) and (t-1) in the region	IND + SUB +	Reynolds (1994) +; Siegfried and Evans (1994) +	Statistics Netherlands
Growth in wage rate - percentage growth between (t-3) and (t-1) in the region	IND +/- SUB +/-	Ashcroft et al. (1991) -; Armington and Acs (2002) +	Statistics Netherlands
Population growth - percentage growth between (t-3) and (t-1) in the region	IND + SUB +	Keeble and Walker (1994) +; Armington and Acs (2002) +; Reynolds et al. (1995) +	Statistics Netherlands
(Entry in) Unemployment - Number of people who newly applied for unemployment benefit in the region, relative to regional population	IND +/- SUB +/-	Evans and Leighton (1990) +; Storey (1991) +; Reynolds et al. (1994) -; Audretsch and Fritsch (1994) +/-; Johnson and Parker (1996) +; Carree (2002) -	Statistics Netherlands
University presence - Dummy variable: 1=presence of university	IND + SUB +	Armington and Acs (2002) +	
<i>Agglomeration</i>			
Localisation economies - Number of existing firms in the region relative to regional population	IND + SUB +	Keeble and Walker (1994) +; Armington and Acs (2002) +	Dutch Chambers of Commerce, Statistics Netherlands
Urbanisation economies - Percentage of people in the region living in highly urbanised areas	IND 0 SUB +	Reynolds et al. (1994) +; Arauzo-Carod and Teruel-Carrizosa (2005) +; Coughlin and Segev (2000)	Statistics Netherlands
<i>Policy environment</i>			
Policy change in 1993 - Year dummies	IND + SUB 0/+	Carree and Nijkamp (2001) +	

TABLE 2  
SUR estimation results for aggregate model (whole regional economy)

	Independent Start-ups	New Subsidiaries
Constant	-4.8 *** (10.2)	-4.7 *** (9.7)
Workforce	.99 *** (21.9)	
Stock of firms		1.08 *** (19.4)
Growth in value added	1.37 ** (2.4)	-.96 (1.3)
Growth in wage rate	-1.32 (1.0)	2.51 (1.4)
Population growth	.28 (0.2)	4.3 ** (2.4)
Unemployment rate (newly unemployed)	-6.6 *** (3.5)	2.2 (0.9)
University presence	-.064 (1.4)	-.008 (0.1)
Degree of localisation (competition)	2.05 (1.1)	-.78 (0.3)
Degree of urbanisation	-.18 (1.1)	.70 *** (3.4)
Dummy 1994 <sup>a</sup>	.34 *** (3.7)	-.18 (1.5)
Dummy 1998 <sup>a</sup>	.25 *** (4.6)	.20 ** (2.8)
Dummy 2002 <sup>a</sup>	.25 ** (2.0)	.092 (0.6)
R <sup>2</sup>	0.93	0.92
N	155	155
Correlation between residuals of both equations:		-0.35
Breusch-Pagan test of independence (p-value):		0.000

Note: Absolute t-values are between parentheses.

\* p < .05

\*\* p < .01

\*\*\* p < .001

<sup>a</sup> Reference year is 1990.



TABLE 3  
SUR estimation results for Manufacturing

	Independent Start-ups	New Subsidiaries
Constant	1.24*** (6.6)	-4.33*** (8.8)
Employment	0.74*** (10.2)	
Stock of firms		0.97*** (11.9)
Growth in value added	0.59 (1.2)	-0.68 (1.4)
Growth in wage rate	-2.89** (1.98)	2.31 (1.5)
Population growth	4.03* (1.7)	2.81 (1.1)
Unemployment rate (newly unemployed)	-13.56*** (3.5)	4.57 (1.2)
University presence	0.04 (0.5)	-0.004 (0.1)
Degree of localisation	160.9*** (4.8)	23.1 (0.6)
Degree of urbanisation	1.13*** (4.4)	1.02*** (3.4)
Dummy 1994 <sup>a</sup>	0.24* (1.7)	-0.05 (0.3)
Dummy 1998 <sup>a</sup>	0.18* (1.8)	0.37*** (3.7)
Dummy 2002 <sup>a</sup>	-0.13 (0.9)	0.25* (1.7)
R <sup>2</sup>	0.77	0.81
N	155	155
Correlation between residuals of both equations:		-0.17
Breusch-Pagan test of independence (p-value):		0.038

Note: Absolute t-values are between parentheses.

\* p < .05

\*\* p < .01

\*\*\* p < .001

<sup>a</sup> Reference year is 1990.

TABLE 4  
SUR estimation results for Services

	Independent Start-ups	New Subsidiaries
Constant	2.41*** (17.6)	-4.67*** (9.3)
Employment	0.99*** (18.0)	
Stock of firms		1.13*** (16.7)
Growth in value added	1.26* (1.7)	-1.65 (1.5)
Growth in wage rate	0.24 (0.3)	1.04 (0.7)
Population growth	0.33 (0.2)	5.03** (2.0)
Unemployment rate (newly unemployed)	-9.85*** (5.2)	3.26 (1.1)
University presence	-0.08 (1.4)	0.001 (0.0)
Degree of localisation	8.39* (1.7)	-4.68 (0.7)
Degree of urbanisation	-0.57*** (2.6)	0.54* (1.9)
Dummy 1994 <sup>a</sup>	0.20** (2.0)	-0.30** (2.1)
Dummy 1998 <sup>a</sup>	0.05 (0.6)	0.20* (1.8)
Dummy 2002 <sup>a</sup>	-0.08 (0.7)	0.15 (0.9)
R <sup>2</sup>	0.92	0.89
N	155	155
Correlation between residuals of both equations:		-0.38
Breusch-Pagan test of independence (p-value):		0.000

Note: Absolute t-values are between parentheses.

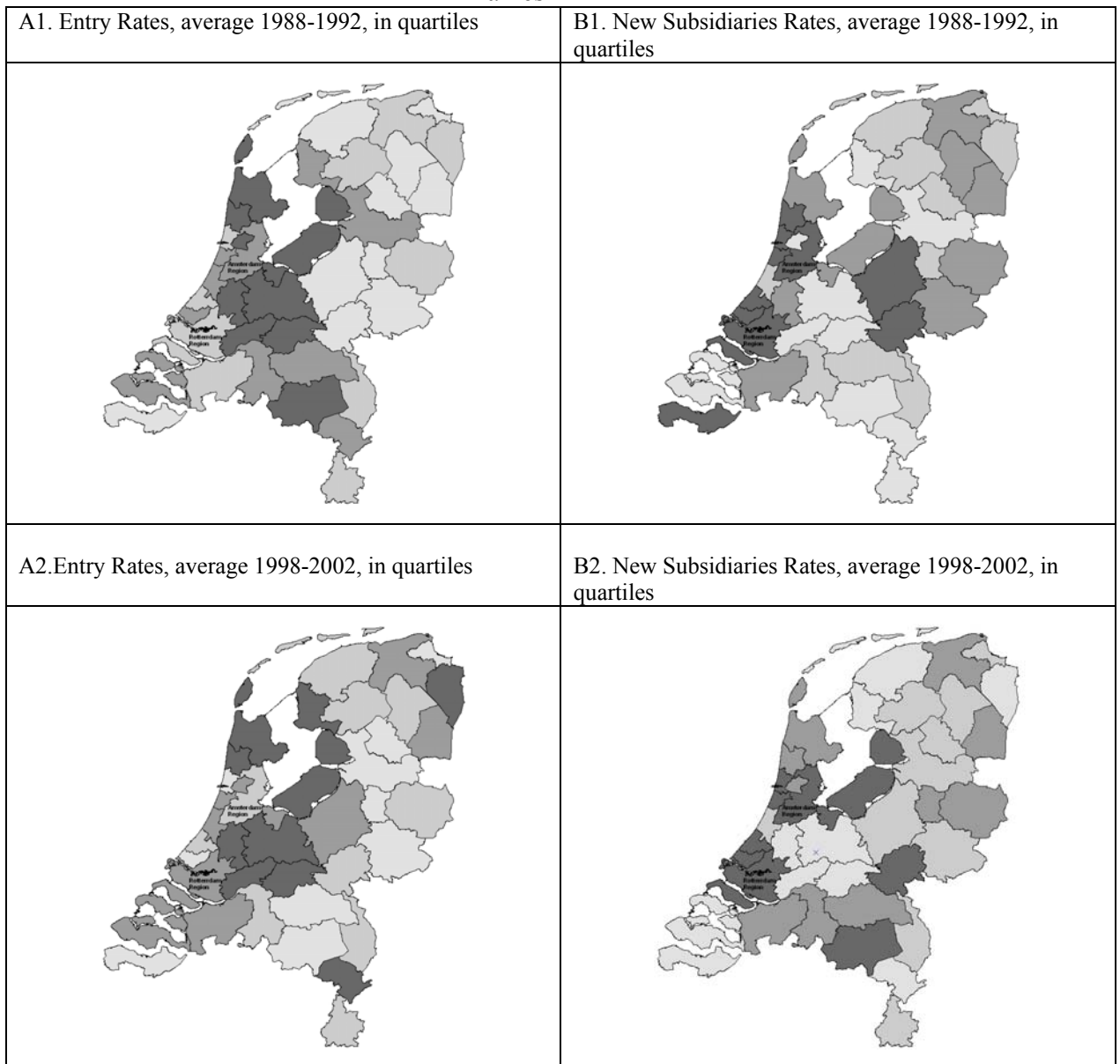
\* p < .05

\*\* p < .01

\*\*\* p < .001

<sup>a</sup> Reference year is 1990.

**FIGURE 1**  
 Firm formation rates for independent entry and new subsidiaries, over two time frames



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## Notes

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<sup>i</sup> These studies find a positive net effect of the number of start-ups on regional employment growth. In contrary to most studies that use gross entry, Bosma and Nieuwenhuijsen (2002) investigate the impact of turbulence (sum of entries and exits) on growth of total factor productivity. They find a positive effect for services and no effect for manufacturing

<sup>ii</sup> However, the relevance of some demographic determinants heavily depends on the regional scale of analysis. For example there is often very limited regional variation in age distributions and practically none in gender distributions within countries at the NUTS1 or NUTS2 level.

<sup>iii</sup> In our data base registrations of new independent startups are separated from registrations of new subsidiaries and new branch plants.

<sup>iv</sup> Note that these correlations refer to the absolute numbers of the two modes of entry, whereas the correlations presented earlier referred to entry *rates*.

<sup>v</sup> These are based on item 1 of a five-item Corop-measure on the degree of urbanization that is formed by information at the zip-code level and provided by Statistics Netherlands. In this measure item 1 represents the percentage of people in the Corop region who live in a highly urbanized area and item 5 represents the percentage in a highly rural area.

<sup>vi</sup> If we use workforce as scaling variable in both equations, the SUR estimates of the unemployment rates are non-significant for both modes of entry. The non-robustness of the effect of this variable is in line with the mixed results found in the literature, see Table 1.

<sup>vii</sup> Also, many low-tech services (new) firms in rural areas sustain the viability of small village communities.